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Claims

[c0001] 1. A brake apparatus with improved heat transfer properties, comprising:
an annular disc; and,
at least one slot in said disc arranged at an angle greater than zero degrees and less than ninety degrees with respect to a radius of said disc passing through said slot.

[c0002] 2. The brake apparatus as recited in Claim 1 wherein said annular disc further comprises a longitudinal axis and first and second face surfaces disposed substantially orthogonal to said longitudinal axis; and,
wherein said at least one slot further comprises a slot surface at least partially bounded by said first and second face surfaces.

[c0003] 3. The brake apparatus as recited in Claim 2 wherein said at least one slot further comprises a protrusion disposed on said slot surface.

[c0004] 4. The brake apparatus as recited in Claim 3 wherein said at least one slot has a length and a midpoint of said length and said protrusion is disposed proximate said midpoint.

[c0005] 5. The brake apparatus as recited in Claim 2 wherein said annular disc further comprises an outer perimeter; and,
wherein said at least one slot is in communication with said outer perimeter.

[c0006] 6. The brake apparatus as recited in Claim 5 wherein said at least one slot further comprises a protrusion disposed on said slot surface.

[c0007] 7. The brake apparatus as recited in Claim 6 wherein said at least one protrusion is disposed proximate said outer perimeter.

[c0008] 8. The brake apparatus as recited in Claim 2 wherein said disc further comprises an inner perimeter; and,
wherein said at least one slot is in communication with said inner perimeter.

[c0009] 9. The brake apparatus as recited in Claim 8 wherein said at least one slot further comprises a protrusion disposed on said slot surface.

[c0010] 10. The brake apparatus as recited in Claim 9 wherein said protrusion is disposed proximate said inner perimeter.

[c0011] 11. The brake apparatus as recited in Claim 2 wherein

said slot surface is substantially rough in texture.

[c0012] 12. The brake apparatus as recited in Claim 2 wherein said at least one slot has a length in a straight shape with respect to a plane orthogonal to said longitudinal axis.

[c0013] 13. The brake apparatus as recited in Claim 2 wherein said at least one slot has a length in an arcuate shape with respect to a plane orthogonal to said longitudinal axis.

[c0014] 14. The brake apparatus as recited in Claim 2 wherein said at least one slot has a length in a shape, with respect to a plane orthogonal to said longitudinal axis, comprising a combination of straight and arcuate segments.

[c0015] 15. The brake apparatus as recited in Claim 2 wherein said annular disc has a thickness measured between said first and second face surfaces; and,
wherein said at least one slot further comprises a first plurality of slots disposed so that each slot in said first plurality of slots is separated from an adjacent slot in said first plurality of slots by a distance, measured along said first surface, less than twice said thickness.

[c0016] 16. The brake apparatus as recited in Claim 2 wherein

said annular disc has a thickness measured with respect to said first and second face surfaces; and,
wherein said at least one slot further comprises a width, measured with respect to said first surface, less than said thickness.

[c0017] 17. The brake apparatus as recited in Claim 2 wherein said annular disc further comprises an outer perimeter and an inner perimeter; and,
wherein said at least one slot further comprises a first slot in communication with said outer perimeter and a second slot in communication with said inner perimeter.

[c0018] 18. The brake apparatus as recited in Claim 17 wherein said annular disc further comprises an annulus disposed midway between said inner and outer perimeters; and,
wherein said first and second slots intersect said annulus.

[c0019] 19. The brake apparatus as recited in Claim 1 wherein said at least one slot further comprises a second plurality of slots disposed in a specified pattern.

[c0020] 20. The brake apparatus as recited in Claim 19 wherein said specified pattern is a homogeneous pattern.

[c0021] 21. The brake apparatus as recited in Claim 1 wherein said annular disc is selected from the group including

solid annular discs and vaned annular discs.

[c0022] 22. The brake apparatus as recited in Claim 1 wherein said annular disc further comprises an inner perimeter; and,
wherein said slot includes a closed end disposed proximate said inner perimeter, configured in a triangular shape, and operatively arranged as a mounting hole for said annular disc.

[c0023] 23. A method for making a brake apparatus with improved heat transfer properties, comprising:
creating an annular disc; and,
forming in said disc at least one slot arranged at an angle greater than zero degrees and less than ninety degrees with respect to a radius of said disc passing through said slot.

[c0024] 24. The method recited in Claim 23 wherein said annular disc further comprises a longitudinal axis;
wherein said creation further comprises forming said disc with first and second face surfaces substantially orthogonal to said longitudinal axis; and,
wherein said formation further comprises forming said at least one slot with a slot surface at least partially bounded by said first and second face surfaces.

[c0025] 25. The method recited in Claim 24 wherein said formation further comprises forming a protrusion disposed on said slot surface.

[c0026] 26. The method recited in Claim 25 wherein said formation further comprises forming said at least one slot with a length and a midpoint of said length and disposing said protrusion proximate said midpoint.

[c0027] 27. The method recited in Claim 24 wherein said annular disc further comprises an outer perimeter; and,
wherein said formation further comprises connecting said at least one slot with said outer perimeter.

[c0028] 28. The method recited in Claim 27 wherein said formation further comprises forming a protrusion disposed on said slot surface.

[c0029] 29. The method recited in Claim 28 wherein said formation further comprises disposing said protrusion proximate said outer perimeter.

[c0030] 30. The method recited in Claim 24 wherein said annular disc further comprises an inner perimeter; and,
wherein said formation further comprises connecting said at least one slot with said inner perimeter.

[c0031] 31. The method recited in Claim 30 wherein said forma-

tion further comprises forming a protrusion disposed on said slot surface.

[c0032] 32. The method recited in Claim 31 wherein said formation further comprises disposing said protrusion proximate said inner perimeter.

[c0033] 33. The method recited in Claim 24 wherein said formation further comprises forming said slot surface with a substantially rough texture.

[c0034] 34. The method recited in Claim 24 wherein said formation further comprises forming said at least one slot with a length having a straight shape with respect to a plane orthogonal to said longitudinal axis.

[c0035] 35. The method recited in Claim 24 wherein said formation further comprises forming said at least one slot with a length having an arcuate shape with respect to a plane orthogonal to said longitudinal axis.

[c0036] 36. The method recited in Claim 24 wherein said formation further comprises forming said at least one slot having a length with a shape, with respect to a plane orthogonal to said longitudinal axis, comprising a combination of straight and arcuate elements.

[c0037] 37. The method recited in Claim 24 wherein said annular

disc further comprises a thickness measured between said first and second face surfaces; and,
wherein said formation further comprises forming a first plurality of slots disposed so that each slot in said first plurality of slots is separated from an adjacent slot in said first plurality of slots by a distance, measured with respect to said first surface, less than twice said thickness.

[c0038] 38. The method recited in Claim 24 wherein said annular disc further comprises a thickness measured between said first and second face surfaces; and,
wherein said formation further comprises forming said at least one slot with a width, measured with respect to said first surface, less than said thickness.

[c0039] 39. The method recited in Claim 23 wherein said annular disc further comprises an outer perimeter and an inner perimeter; and,
wherein said formation further comprises forming a first slot extending to said outer perimeter and a second slot extending to said inner perimeter.

[c0040] 40. The method recited in Claim 39 wherein said annular disc further comprises an annulus disposed midway between said inner and outer perimeters; and,
wherein said formation further comprises disposing said

first and second slots to each intersect said annulus.

[c0041] 41. The method recited in Claim 23 wherein said formation further comprises disposing a second plurality of slots in a specified pattern.

[c0042] 42. The method recited in Claim 41 wherein said disposal further comprises disposing said second plurality of slots in a homogeneous pattern.

[c0043] 43. The method recited in Claim 23 wherein said creation further comprises creating said annular disc selected from the group including solid annular discs and vaned annular discs.

[c0044] 44. The method recited in Claim 23 wherein said annular disc further comprises an inner perimeter; and,
wherein said formation further comprises forming said at least one slot with a closed end disposed proximate said inner perimeter, configuring in a triangular shape, and operatively arranging as a mounting hole for said annular disc.